Marine Spatial Planning
&
Implications of climate change on ecosystems in the Baltic Sea
- *A selection* -

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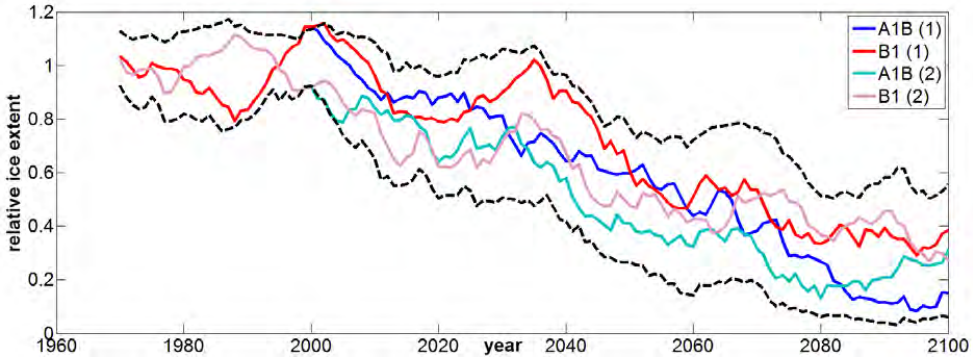
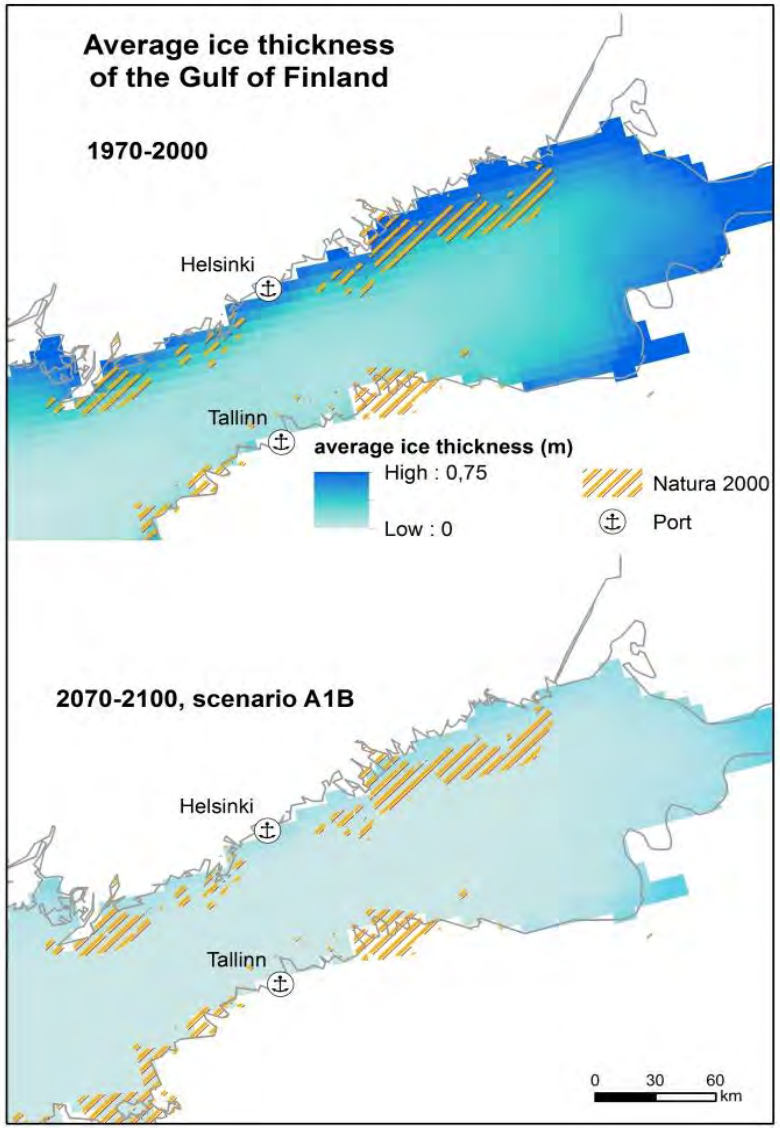
Baltic Sea Region Programme 2007–2013
Part-financed by the European Union
(European Regional Development Fund)

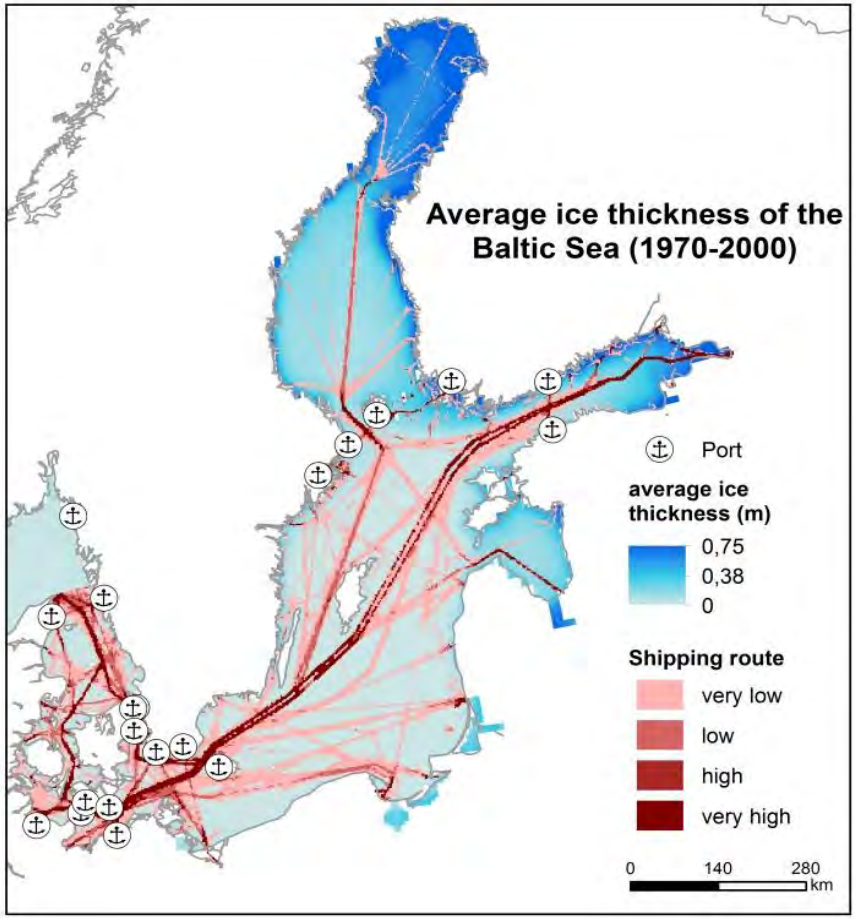
Changes in ice coverage



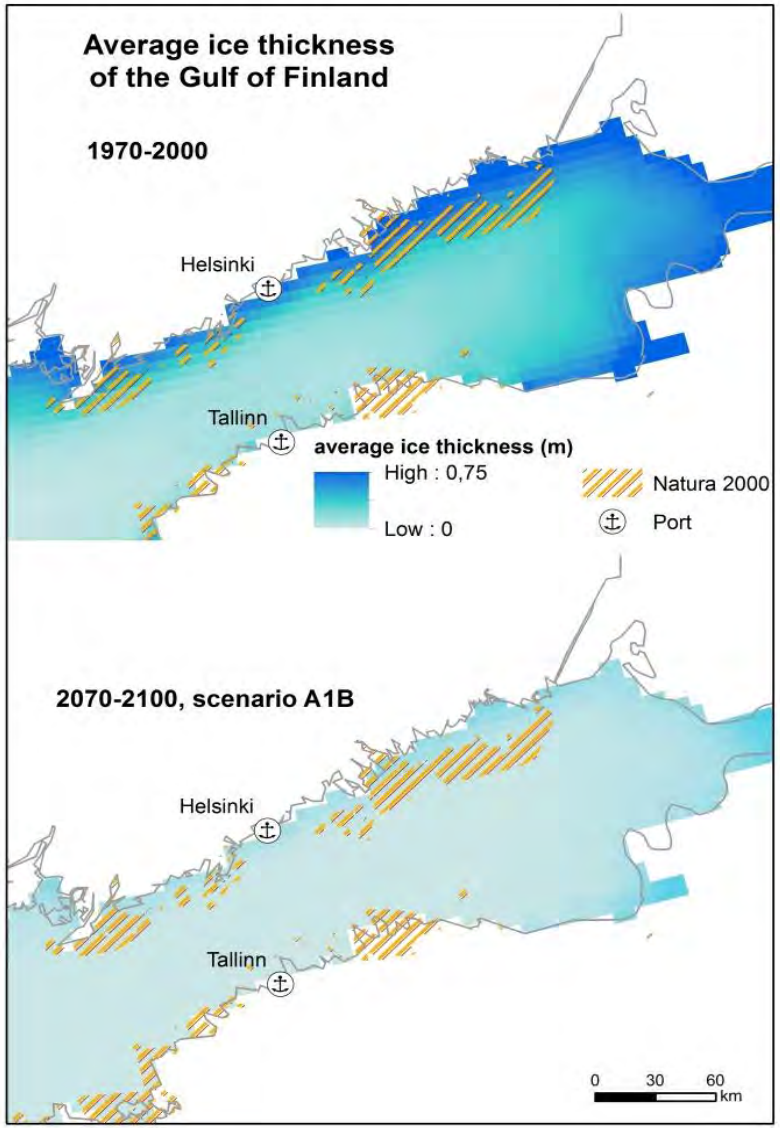
- Ice coverage decreases about 60%
- Main impact from 2030 onwards
- Ice covered area in the Baltic Sea goes back up to 10,000 km²



Friedland, Hiller, Janßen, 2013



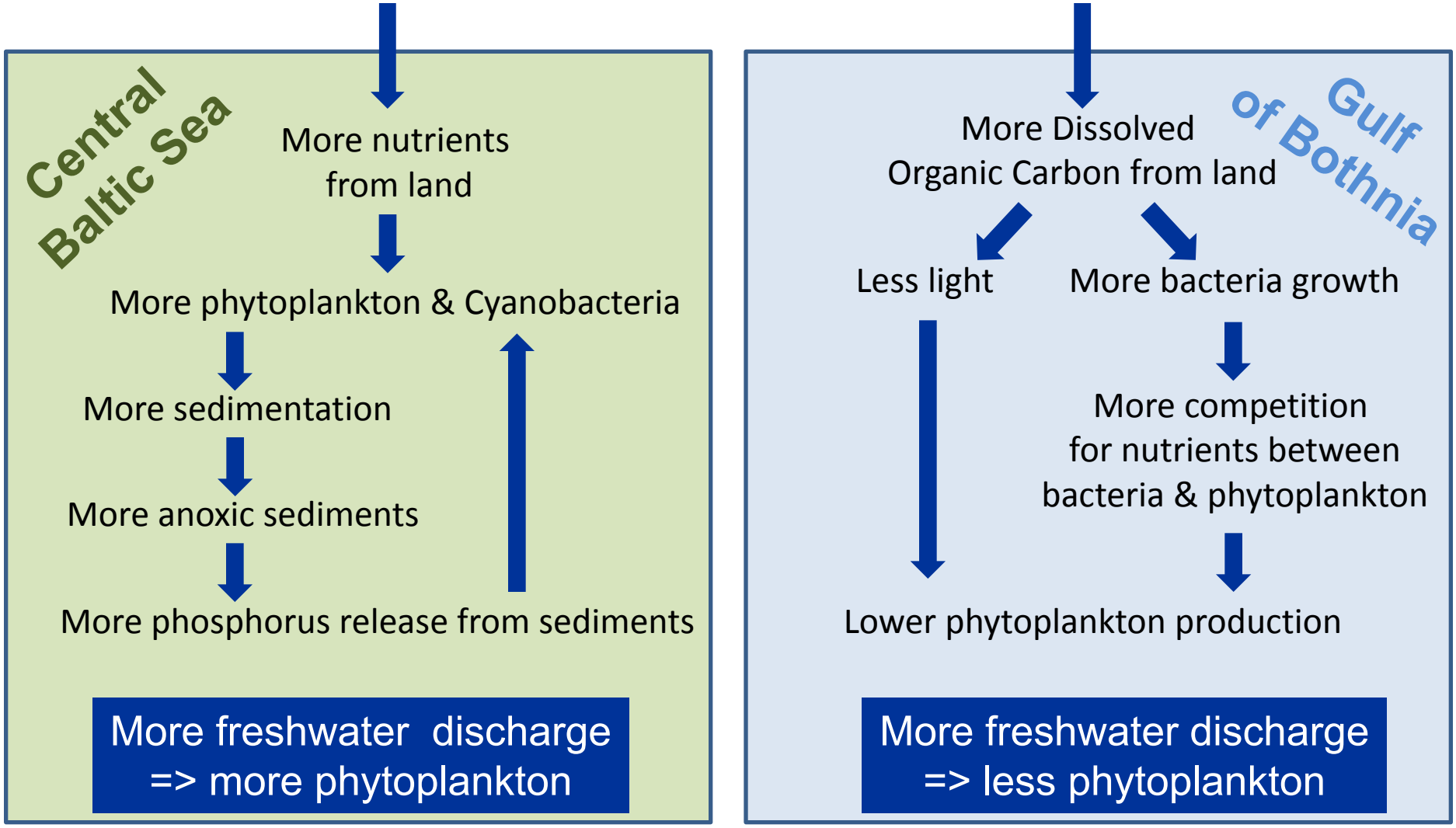
- direct impacts on the ecosystem, e.g. the ringed seal's breeding conditions
- positive economic effects on shipping, impact on shipping routes



Friedland, Hiller, Janßen, 2013

Changes in eutrophication

Eutrophication



Impacts on

– coastal tourism
– aquaculture
– fisheries
– habitats and
– Marine Protected Areas

stressor with indirect impacts on MSP

Sea level changes

1) Macrophytes

Sea level rise

↓

Less light in deeper water layers

↓

Decrease of macroalgal vegetation e.g. in Kattegat (approx. 13% per 1 m rSLR)

- Important habitats
  - favour the retention of suspended particles,
  - contribute to water-quality improvement and shore-line protection from erosion,
  - important for fish and fishery

- HELCOM-VASAB MSP principles: ”Maritime Spatial Planning must seek to protect and enhance the marine environment“

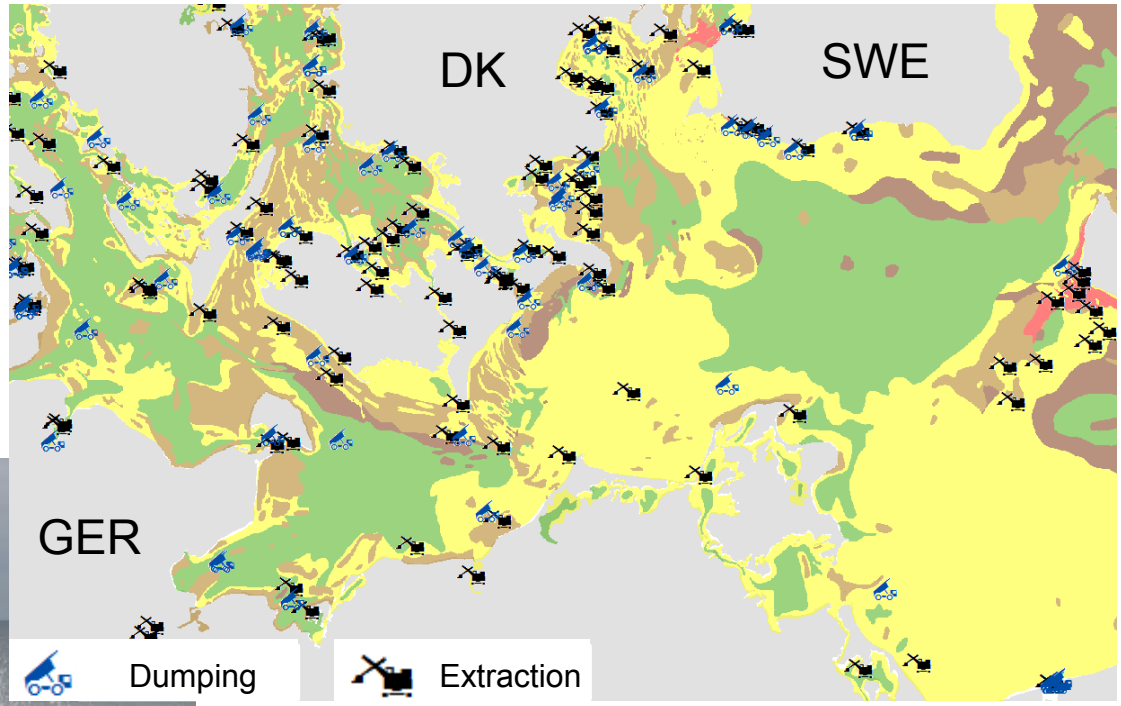
- MSP regulations on protection?

2) Coastal protection

Sea level rise

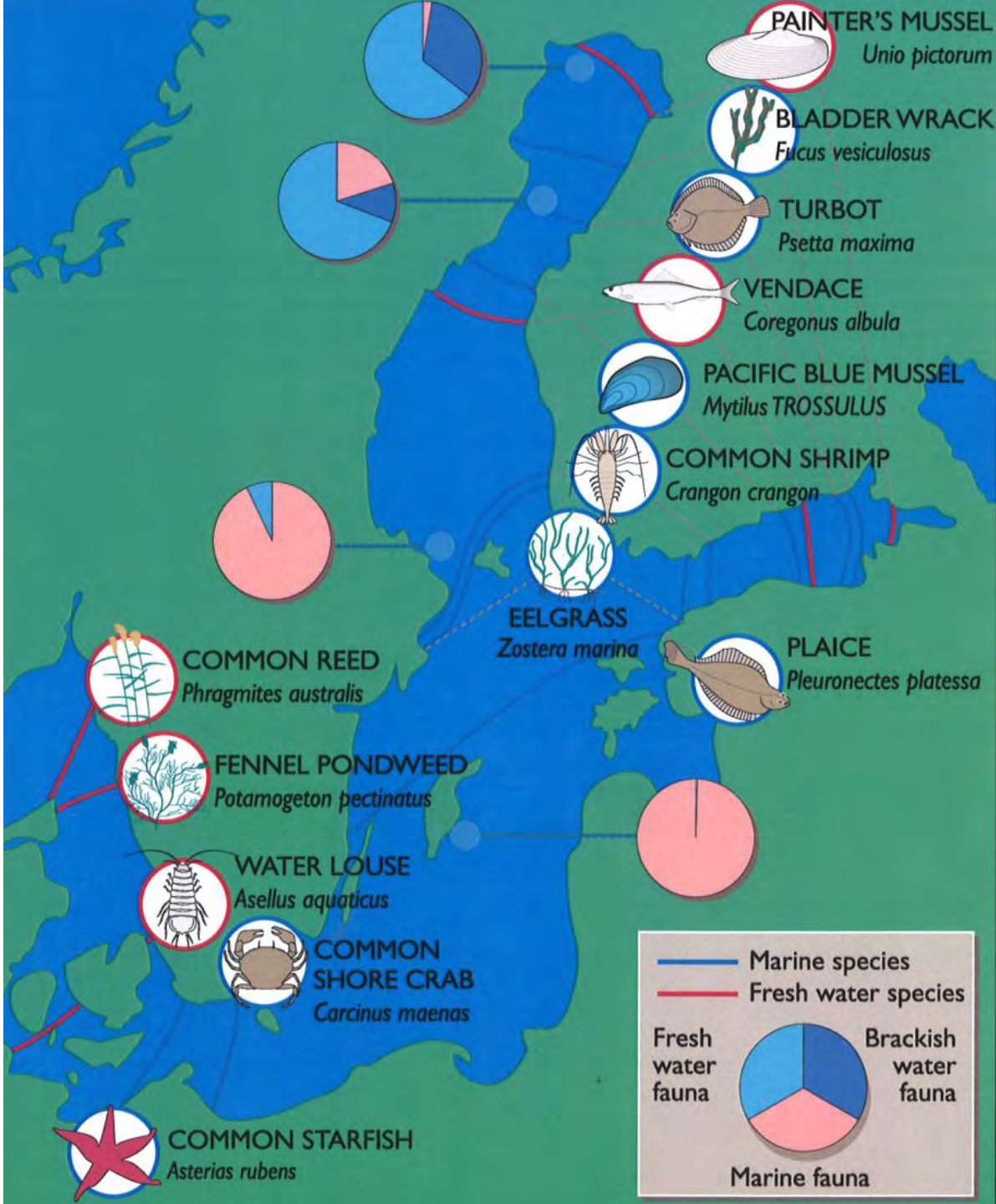
Increased need for coastal protection measeures, e.g. beach nourishments

Increased extraction of mineral resources



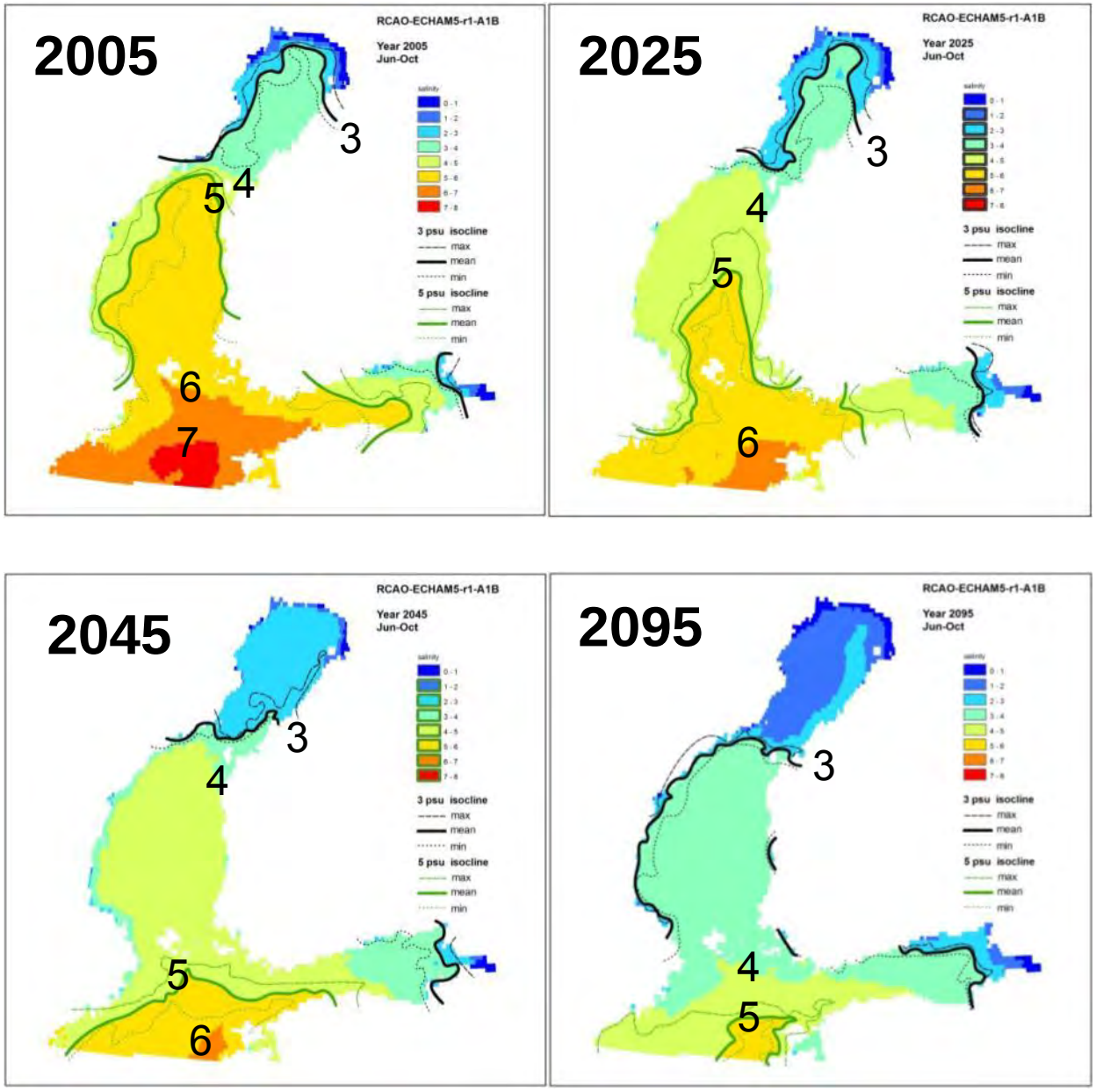
Changes in salinity

Salinity and species distribution



Source: Baltic Sea transparencies
www.ymparisto.fi

Baltic Sea surface salinity and biogeography

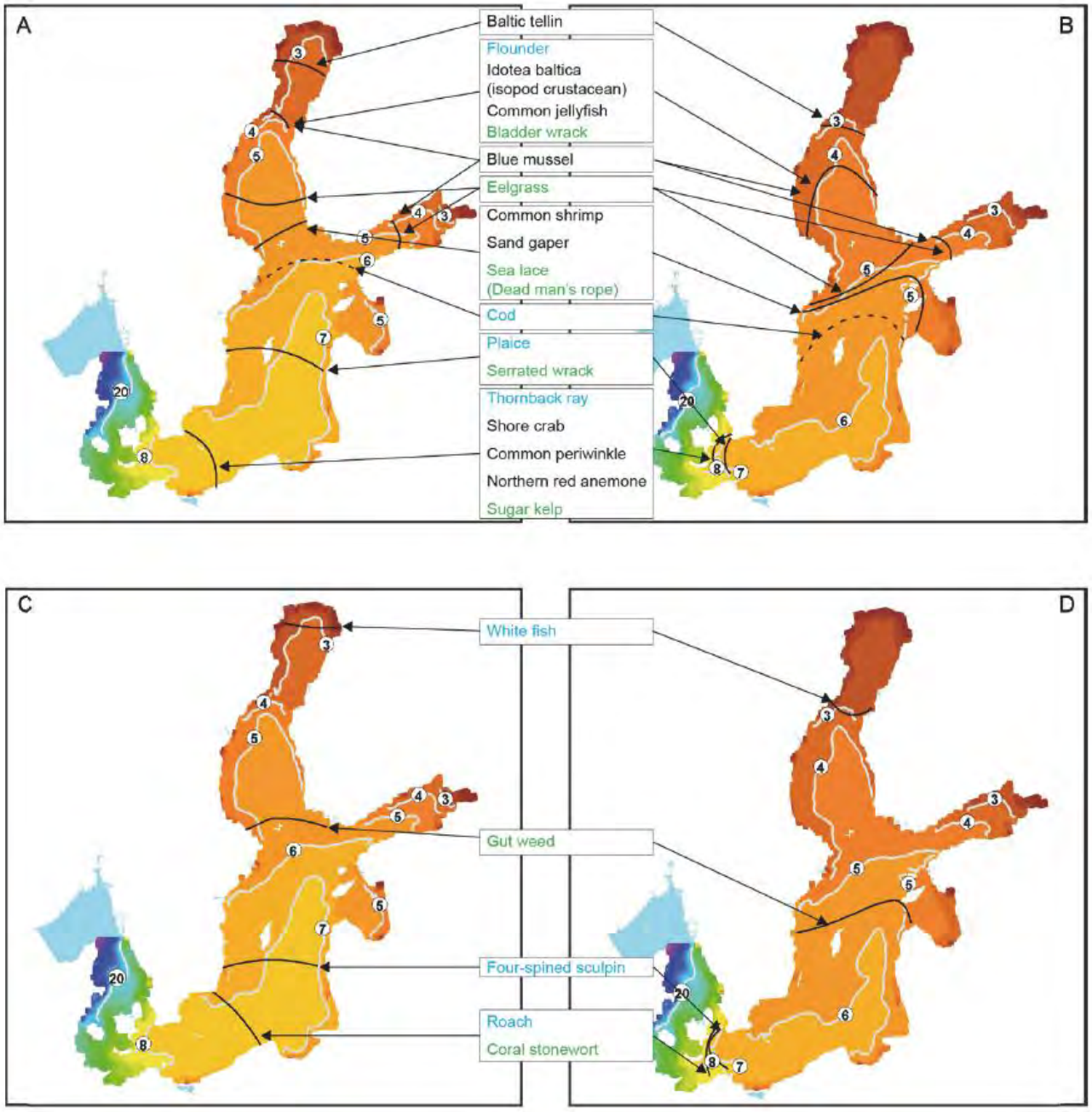


Ljungberg et al., in prep.
MARISPLAN project

Original data:
ECOSUPPORT, courtesy of
Markus Meier, SMHI, Sweden

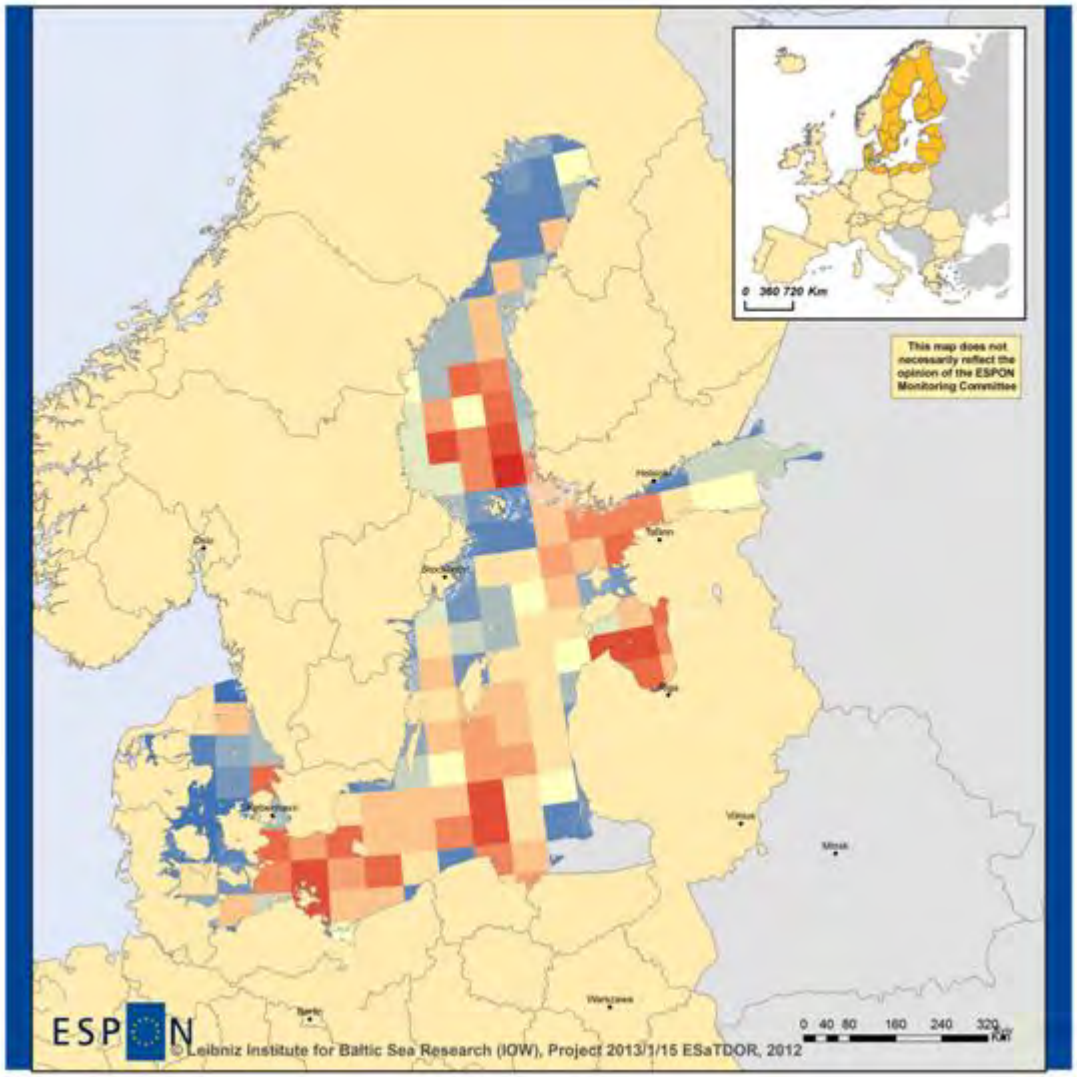
Today

Future



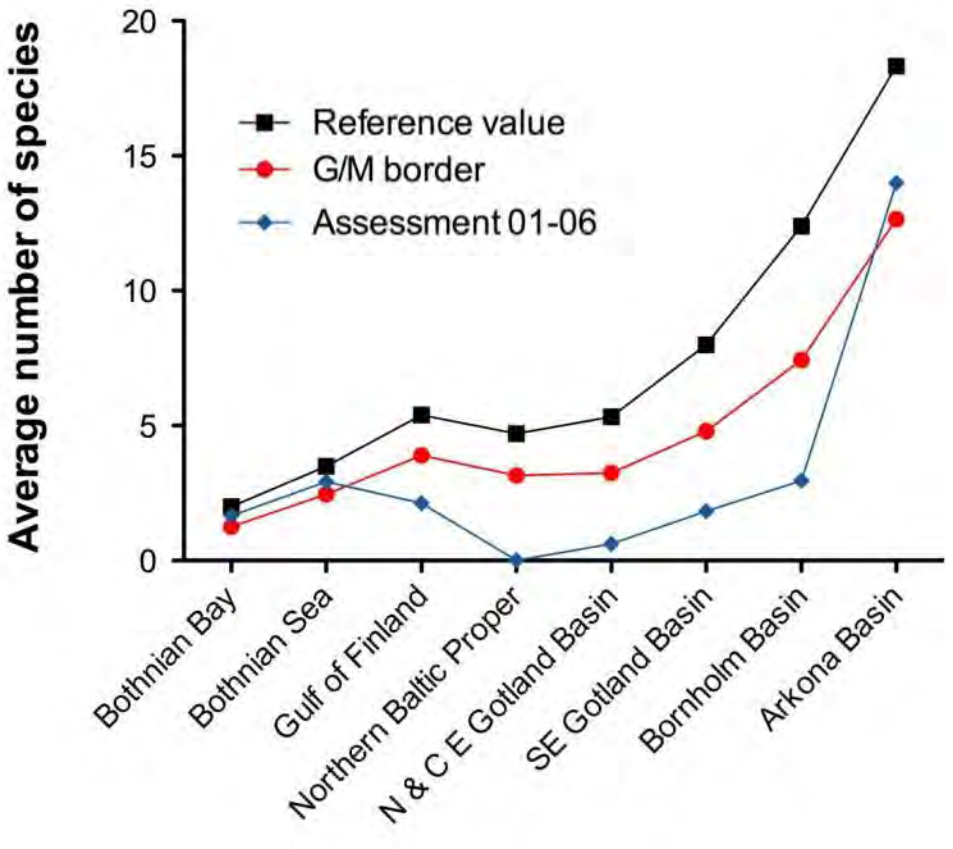
Meier 2011,
Bonsdorf 2006,
Dahl et al. 2013,
baltadapt 2012

Spatial shifts in fisheries



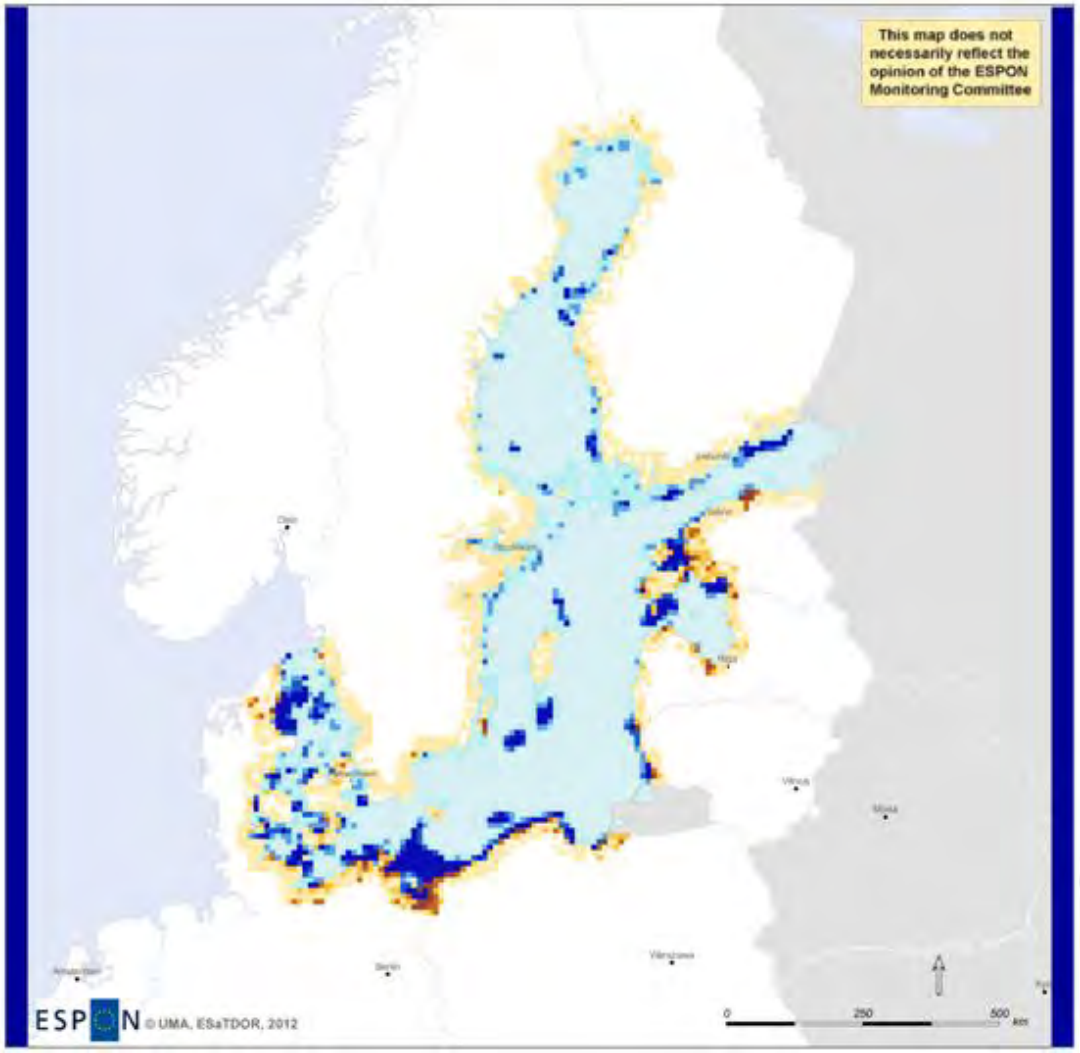
Total commercial fisheries in 2008

Benthos diversity will go down with salinity



Villnäs A, Norkko A (2011) Benthic diversity gradients and shifting baselines: implications for assessing environmental status. Ecological Applications, 21: 2172-2186

Spatial shifts of Marine Protected Areas



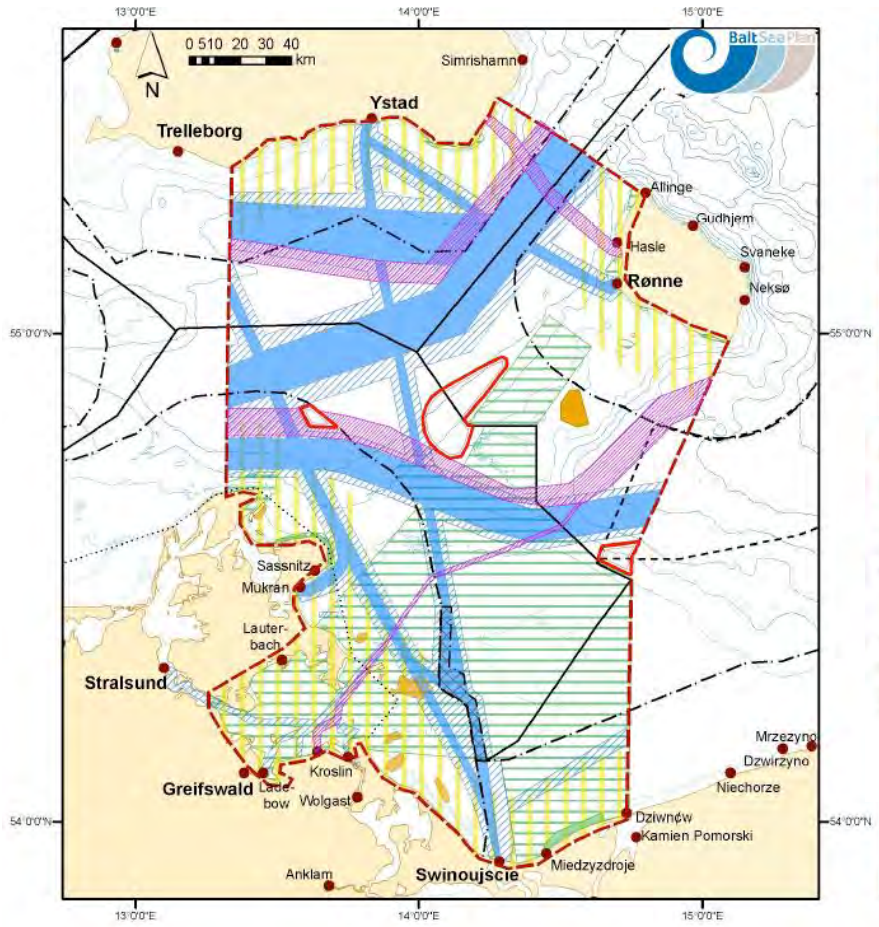
Natura 2000 areas

Summary

Climate change will impact …

- Maritime transport routes and shipping intensity
- Species abundance and distribution
- Quality, location and protection goals of/for MPAs
- Intensity and spatial extend of sediment extraction; increased political importance
- Spatial allocation of fishing effort and fished species
- Conditions for aquaculture
- Conditions for coastal tourism
- …

Impacted by Climate Change



Regulations

Shipping
- Priority Area Shipping
- Reservation Area Shipping

Offshore Wind Energy
- Suitable Area Wind Energy

Submarine Cables/Pipelines
- Reservation Area Cables/Pipelines

Marine Raw Materials
- Priority Area Sand and Gravel
- Reservation Area Sand and Gravel

Nature Conservation
- Priority Area Nature Conservation
- Reservation Area Nature Conservation

Tourism
- Reservation Area Tourism

Fishery
- Reservation Area Fishery

(No areas designated yet - should be further developed based on more detailed data.)

Map Projection:
Mercator (54°N), WGS 84
BSH / 24.04.2012

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

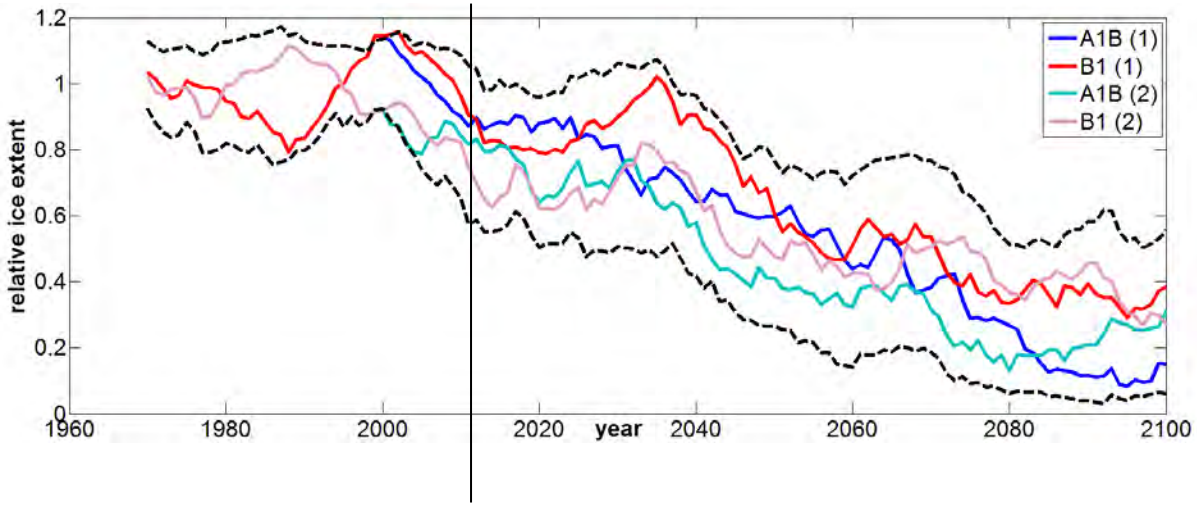
BaltSeaPlan
2009 Planning the future
2012 of the Baltic Sea

Part-financed by the European Union (European Regional Development Fund)

BaltSeaPlan Pomeranian Bight Draft Plan

Climate change impacts …

- will differ from sub-region to sub-region
- will develop non-linear



MSP needs to be flexible and adaptive

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